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Research Protocol

Ayurveda Section

Evaluating Ayurvedic Digestive Function (*Agnimandya*) in Common Childhood Ailments in Comparison with Healthy School Going Children: A Case-control Study Protocol

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ABSTRACT

Introduction: *Agni* (digestive fire) plays a central role in health in Ayurveda, and its balance is crucial for digestion and metabolism. *Jatharagni* (digestive fire) imbalance may result in different metabolic disorders. The present study aims to assess the prevalence and status of *Jatharagni* in children with various health conditions using questionnaires and standardised assessment scales.

Need of the study: Ayurveda views *Agni* imbalance as a key factor in many childhood disorders, like digestive, respiratory, and musculoskeletal issues. Early identification of *Agnimandya* in healthy school-going children can help prevent future diseases. Research in this area aids in spotting early risk factors, enabling timely interventions to promote overall health and well-being, and supporting children's physical and mental development.

Aim: Validation of *Agnimandya* concept and comparative assessment in common paediatric ailments (respiratory system disorder, gastrointestinal disorder and musculoskeletal system disorder) versus healthy school-going children nearby Wardha, Maharashtra, India.

Materials and Methods: The present case-control study will be conducted at the Kaumarbhritya Outpatient Department (OPD) and Inpatient Department (IPD) of Mahatma Gandhi Ayurved College Hospital and Research Centre, Salod (Hi), and nearby Zilla Parishad (ZP) schools in Wardha, Maharashtra, India over 15 days from 15th November to 30th November 2025. Children aged 10 to 16 years will be enrolled and categorised into four groups: Group A (Cough/*Kasa*), Group B (*Karshya*/underweight), Group C (Constipation/*Vibandha*), and Group H (healthy controls), with 35 participants in each group (total n=140). Data will be collected through structured interviews using validated questionnaires and *Agni* assessment scales. Parameters like *Agnimandya* (imbalance of digestion), and subjective symptoms such as *Kasa* (cough), *Karshya* (underweight), and *Vibandha* (constipation) will be analysed for association with *Jatharagni* status. The study is expected to clarify the relationship between *Agnimandya* and selected paediatric disorders and contribute to evidence-based validation of Ayurvedic assessment principles. Kruskal-Wallis test, Mann-Whitney U test, and Chi-square test will be applied as appropriate. A p-value <0.05 will be considered statistically significant.

Keywords: Ayurveda, Constipation (*Vibandha*), Children, Cough (*Kasa*), Digestive fire, *Karshya* (underweight)

INTRODUCTION

All physical diseases arise solely from a slowing down of the gastrointestinal fire [1]. In Ayurveda, *Agni* refers to the digestive fire responsible for breaking down food material into simpler forms that can be absorbed and utilised by the body. It's analogous to the digestive processes in modern physiology. *Rasa* refers to the first product of digestion, often described as a nutrient-rich fluid. Mala refers to waste products or by-products of digestion, including substances like faeces, urine, and sweat etc., [2]. The attainment of strength, *varna*, age, happiness of mind, and equanimity of fire are indeed considered important indicators of health in Ayurvedic Philosophy [3]. Age, strength, health, enthusiasm, bodily growth, *oja*, energy, radiance, digestive fire, and life itself are all maintained at their best when the fire is intense. If digestive function becomes severely impaired, a person dies. If the fire continues properly, the patient remains healthy for a long time [4].

Health is a state of complete physical, mental, and social well-being and not merely an absence of disease or infirmity [5]. Every living thing wants to live a life free from illness, yet at some point in its life, it will inevitably experience some form of illness or suffering. The characteristics of a healthy person, as outlined by Ayurveda. All three *doshas*, *vata*, *pitta*, and *kapha,* are in equilibrium; *Jatharagni* is in a normal state; the *dhatus* (tissues) are in a normal state and function, including *rasa, rakta, mamsa, medas, asthi, majja, and shukra*; the *mala* are in a normal state and function, including *purisha* (faeces), *mutra* (urine), and *sweda* (sweat); the soul is pleasant, the mind is pleasant, and the senses are perceptible [6].

Agni is regarded as being crucial to both the cause and preservation of health. The primary factor influencing a person's health and the onset of diseases is the food they consume [6]. Food is the most important factor in both promoting health and causing illness. The digestive system changes metabolically when food and beverages are consumed. Following the digestive process, it has both pleasurable and disagreeable effects on the body. *Jatharagni*, or digestive fire, is primarily responsible for the digestion process. Body tissues receive nourishment from food, which is transported to the final organ by *Agni*. Since tissue components like *rasa*, etc., cannot come from undigested food, *Agni* is therefore essential in this regard. Life only exists because of *Jatharagni*, and when it is lost, people die; when it is properly maintained, people live long lives; when it is impaired, diseases arise. Colour, strength, health, zeal, plumpness, complexion, *Ojas*, *Tejas*, and other *Agni* and *Prana* kinds are also the causes [6].

Jatharagni can be divided into four states: *sama* (well-maintained and regular), *manda* (weak), *tikshna* (intense), and *Vishama* (irregular) [6].

Vishamagni is an irregular word. Sometimes *Vishamagni* breaks down food properly, and other times it doesn't [6]. *Vatadosha* influences *Vishamagni* [6], and is therefore erratic. A gurgling sound in the abdomen and tenesmus, flatulence, colic pain, heaviness, upward *vayu* movement, and diarrhoea are all signs of inadequate food digestion [6]. Agni is classified as Vishamagni when such symptoms occur despite regular dietary intake.

"*Tikshna*" means "intense" *Tikshnagni* has a rapid rate of digestion, even for huge amounts of food [6]. Any kind of dietary irregularity can be tolerated by it [6]. *Pittadosha* has an impact on it [6]. It is what gives it its powerful character. Tissue damage results from excessive *tikshna* intensity and inadequate food intake. Furthermore, it comes in three different kinds according to its intensity: *tikshna*, which causes the food to be digested rapidly; *atyagni*, also known as *bhasmaka*, which is produced by not levelling *Tikshnagni*; and *tikshnatama*, which is the result of not levelling *aţyagni* and causes the individual to never be satiated with the amount of food they eat. In addition to pyrexia and dry lips, throat, and palate, this causes a burning feeling [6].

"*Manda*" implies "mild." *Agni*'s strength is lower in this condition. Because it affects *Agni's* ability to assimilate, even the smallest change in the usual amount is felt strongly [6]. The influence of *kaphadoṣha* on *Mandagn* [6]. In *Vibandha*, *Agnimandya*, i.e., (lack of appetite) is present, which creates *Ama* (undigested toxic element) and *Srotorodha* (blockage in microchannels) [7]. *Mandaagni* causes heaviness in the head and abdomen, coughing, dyspnea, excessive salivation, vomiting, and pain throughout the body because it cannot digest even little amounts of food. Even tiny amounts of food take a long time to digest. All pathogenesis is thought to have this as its fundamental cause [6]. *Sama* is a term that signifies balanced or regular. When the *tridoshas* are in a balanced state, *Samagni* results [6]. As long as there are no dietary anomalies, it preserves health. When food is properly measured and consumed on schedule, it digests properly. Small anomalies also affect *Agni's* balanced state, which can harm health [6]. Ayurveda considers *Agni* imbalance as a root cause of various health issues, including those commonly seen in children, such as digestive disorders, respiratory disorders, musculoskeletal disorders, etc. Identifying *Agnimandya* in healthy school-going children can help prevent the development of future health problems by addressing early imbalances. Research on *Agni* assessment in healthy children can identify risk factors and early markers of imbalances, allowing for targeted interventions to promote optimal health and prevent diseases.

By understanding and addressing *Agni* imbalances, healthcare providers can support children in reaching their full potential, both physically and mentally, and lay the foundation for a lifetime of wellness.

REVIEW OF LITERATURE

In Ayurveda, *Agnimandya* refers to the weakening of the digestive fire (*Agni*), which leads to improper digestion and disrupted metabolism [8]. According to *Kashyapa Samhita*, "*Agnimandyaat* ama *utpattih*", meaning that impaired *Agni* in children results in the formation of *Ama*, a toxic by-product that obstructs bodily channels and contributes to various paediatric disorders. Since a child's digestive fire is naturally underdeveloped, this can lead to poor digestion, reduced immunity, and frequent illnesses. Thus, maintaining optimal *Agni* is considered essential for healthy growth and development.

Prakash VS et al., found that *Agnimandya* and *Apana Vata Dushti* are consistently involved in the pathogenesis of constipation, along with dysfunctions in *Pachaka Pitta*, *Avalambaka Kapha*, and *Samana Vata* [9]. Deshmukh J emphasised that *Vibandhata* (constipation) arises due to deficiencies in *Rasa Dhatu* (the primary nutritional fluid) and imbalances in *Agni*. Management typically involves the use of *Deepana* (appetising) and *Pachana* (digestive) herbs to restore digestive function [10].

Bhat P et al., further evaluated *Vibandha* as a condition caused by vitiation of *Vata Dosha*, particularly *Apana Vata*, in conjunction with *Agnimandya*. Their findings confirm that both *Agnimandya* and *Apana Vata Dushti* are invariably present in the *Samprapti* (pathogenesis) of *Vibandha* [11]. Chouragade NB et al., classified digestive profiles based on *Agni* types: individuals with *Vishamagni* had *Krura Koshtha*, *Vata*-dominant *Prakruti*, and *Nirama Mala*; those with *Mandagni* showed *Madhyam Koshtha*, *Kapha*-dominant *Prakruti*, and *Sama Mala*; *Tikshanagni* was associated with *Mrudu Koshtha*, *Pitta*-dominant *Prakruti*, and *Sama Mala*; while *Samagni* was rare, observed in individuals with *Madhyam Koshtha*, *Pitta*-dominant *Prakruti*, and *Nirama Mala* [12].

Agnimandya is a foundational concept in Ayurvedic pathology and is believed to be a root cause of many diseases. Paediatric conditions frequently present with signs of impaired digestion, yet there is limited scientific validation of *Agnimandya* in children. This study thereby helps to validate Ayurvedic diagnostic principles and support early, holistic interventions. By exploring whether *Agnimandya* is more prevalent or manifests differently in ill children, the study seeks to reinforce its clinical relevance in paediatric care.

Therefore, the present study will be conducted to validate the *Agnimandya* concept and comparative assessment in common paediatric ailments (respiratory system disorder, gastrointestinal disorder and musculoskeletal system disorder) versus healthy school-going children nearby Wardha.

Objectives:

- To estimate the prevalence and status of *Jatharagni* in healthy and affected children with the help of pre-validated questionnaires.
- To evaluate the association of *Jatharagni with different* paediatric ailments (respiratory system disorder, gastrointestinal disorder and musculoskeletal system disorder)

MATERIALS AND METHODS

A case-control study will be conducted at the Kaumarbhritya OPD and IPD of Mahatma Gandhi Ayurved College Hospital and Research Centre, Salod (Hi), and nearby Zilla Parishad (ZP) schools in Wardha, Maharashtra, India. The study will be carried out over 15 days, from 15th November to 30th November 2025. The study received ethical clearance from the institutional Ethics Committee of MGACH&RC, with approval reference number MGACHRC/IEC/JUN-2024/823, and the study has been registered under the Clinical Trial Registry of India with the registration number CTRI/2025/03/082303. Written informed consent will be obtained from all participants or their parents/guardians before their inclusion in the study, ensuring that ethical guidelines and confidentiality are strictly followed throughout the research. Consecutive eligible participants will be recruited.Healthy controls will be recruited from nearby schools using convenience sampling.

Inclusion criteria: Children aged between 10 and 16 years, regardless of sex, religion, or socioeconomic background, will be recruited. Subjects must meet the health assessment criteria for either *Kasa* (Cough), *Karshya* (underweight), or *Vibandha* (Constipation), each identified based on classical signs and symptoms as per Ayurvedic texts. In the present study, the study investigators have selected one common disorder from each of three major physiological systems: *Kasa* (cough) from the respiratory system, *Vibandha* (constipation) from the gastrointestinal system, and *Karshya* (underweight) from the musculoskeletal system. These conditions were deliberately chosen because they are relatively common and generally do not significantly impair an individual's daily life or cause major discomfort. As a result, participants can comfortably and openly respond to research questions without hesitation. This selection strategy also allows for the inclusion of multiple physiological systems within a single study framework,

thereby facilitating a more comprehensive assessment. Additionally, apparently healthy children with no ongoing health issues will be included as the control group.

Exclusion criteria: Children younger than 10 years or older than 16 years, participants who do not meet the diagnostic criteria of the three selected disease conditions, and children or parents/guardians who are not willing to provide written informed consent for participation in the study.

Children meeting the inclusion criteria and providing written consent will be divided into four groups: Group A-children with *Kasa* (cough) (n=35), Group B-children with *Karshya* (underweight) (n=35), Group C-children with *Vibandha* (constipation) (n=35), and Group H-healthy children (n=35), making a total sample size of 140 participants. Data will be collected through structured interviews or surveys conducted in the local language, either with the children or their parents/guardians, using specifically designed and validated questionnaires and assessment scales for evaluating the status of *Agni* in each health condition. Clinical assessment and examinations will be carried out in accordance with the assessment tools prepared for the study. Ethical practices, confidentiality, and participant welfare will be maintained throughout the research process. The GANTT chart for the present study is depicted in [Table/Fig-1].

Sample size calculation: The study target population consists of nearly 200 individuals who meet the inclusion and exclusion criteria.

Scholar/ Investigator	Dr Faiz Ahmad Mohammad Firoz Shah				
Title	"Comparative Assessment of the Agnimandya Concept in Common Paediatric Ailments versus Healthy School-going Children near Wardha, Maharashtra, India: A Case-control Study Protocol"				
Steps	Q1	Q2	Q3	Q4	Q5
Approval from IEC					
Review of literature					
Enrolment of patient					
Data collection					
Statistical analysis					
Thesis writing					
Submission					

[Table/Fig-1]: GANTT chart.

The minimum required sample size is calculated using a formula based on the proportion from the population size. The estimated target population size N is obtained from a retrospective review of institutional data and previous records from the paediatric department of MGACH&RC. Specifically, over the past year, approximately 200 paediatric patients aged 10 to 16 years, who fit the study's criteria, were treated or registered in the outpatient and inpatient departments. This estimate was used solely to determine the minimum required sample size using the finite population correction formula [13].

$$n=\frac{N}{1+Nd^2}$$

$$n=\frac{200}{1+200\ (0.05)^2}=134$$

N = Estimated target Population = 200

D= Estimated Error =5%

n = Minimum sample size required

A total of 140 children were divided into 4 groups of 35 each.

Study Procedure

a) Assessment of *Agni* Questionnaire [14]: This study will use a closed-ended Likert scale questionnaire with five choices- strongly agree, agree, neutral, disagree, and strongly disagree- to assess *Agni*. Except for item 16, which will be scored in reverse order, the responses will be graded as 5, 4, 3, 2, and 1, respectively.

b) Question related to *Kasa* (Cough) [15]:

- *Kantha Kandu* ----------(Yes/no)
- *Bhojyanamavrodhascha* ----------(Yes/no)
- *Aruchi* ----------(Yes/no)
- *Kapha Nisthivanam* ----------(Yes/no)
- *Vega* ----------
- *Appetite* ----------(Increased/Decreased)
- *Bowel habit* ----------(Regular/Irregular)

c) Question related to *Karshya* (underweight) [16]:

- *Shushka Nitamba* ----------(Yes/no)
- *Shushka udar* ----------(Yes/no)
- *Shushka griva* ----------(Yes/no)
- *Dhamani jala* ----------(Yes/no)
- *Sthul parva* ----------(Yes/no)
- Appetite ----------(Increased/Decreased)
- Bowel habit ----------(Regular/Irregular)

d) Question related to *Vibandha* (constipation) [17]: Depending on the severity of the present or absent symptom, the clinical aspects of flatulence, *Udarshoola, Kshudhamandya*, frequency of defaecation, and consistency of faeces were evaluated as 03, 02, 01, and 00.

Vibandha's clinical grading system was used for evaluation.

Udarshool:

- 0-Absent
- 1-Present

Kshudhamandya:

- 0- Child himself asks for food and takes adequately
- 1- Child himself asks for but does not take adequately
- 2- Child does not take adequately
- 3- Child does not ask and does not take food by request

Frequency of defaecation:

- 0- Defaecation Once
- 1- Defaecation once every alternate day
- 2- Defaecations 2-3 times/day
- 3-2 to fewer defaecations/week

Consistency of faeces:

Grade 0 1

- Consistency of faeces Unformed Formed
- Pain during Defaecation Absent Present
- Straining during Defaecation Absent Present

Flatulence:

- 0-Absent 1-Present

***Ashtavidha Pariksha* [18]:**

1. ***Nadi*:** *Druta /Manda /Sadharan*
2. ***Mootra*:** *Alpam /Bahu /Peetam /Sa-raktam /Savedanam / Atyushnam /Atishitam*
3. ***Mala*:** *Grathita /Sadharana /Asamhata*
4. ***Jihwa*:** *Upaliptam /Anupaliptam*
5. ***Shabda*:** *Mookam /Minminam /Gadgadam /Alpavak /Sadharana*
6. ***Sparsha*:** *Sheeta /Anushnashita /Ushna /Ruksha/ Snigdha*
7. ***Drik*:** *Aavilam /Panduram /Peetam /Raktam /Sadharana*
8. ***Akruti*:** *Krisha /Sthoola /Hraswa /Deergha /Sadharana*

***Dashvidha Pariksha* [19]:**

1. ***Dooshya*:** *Rasa /Rakta /Mamsa /Meda /Asthi /Majja /Shukra*
2. ***Desh*:** *Jangal/Anoop/Sadharan*
3. ***Bala*:**
4. ***Kala*:** *Kshanadi /Vyadhyavastha*
5. ***Anala*:** *Sama /Visham /Manda /Teekshna*
6. ***Prakriti*:** *Vata/Pitta / Kapha/ Vatapitta/ Vatakapha/ Pittakapha/ Vatapittakapha*
7. ***Vaya*:** *Balyavastha*
8. ***Satwa*:** *Heen /Madhyam /Pravar*
9. ***Satmya*:**
10. ***Aahara*:**

STATISTICAL ANALYSIS

Data will be analysed using IBM Statistical Package for Social Sciences (SPSS) Statistics version 26.0. The Kruskal-Wallis test will be used for comparing *Agni*-related parameters across the four groups. Mann-Whitney U test will be used for post-hoc pairwise comparisons. Chi-square test or Fisher's-exact test will be used for categorical data. A p-value <0.05 will be considered statistically significant.

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